Available online at www.joac.info

ISSN: 2278-1862

Journal of Applicable Chemistry

2014, 3 (4): 1713-1718

(International Peer Reviewed Journal)

Assessment and Physical Characterization of Solid Waste in Nagar Panchayat Chitrakoot, Satna

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Accepted on 15th June 2014

ABSTRACT

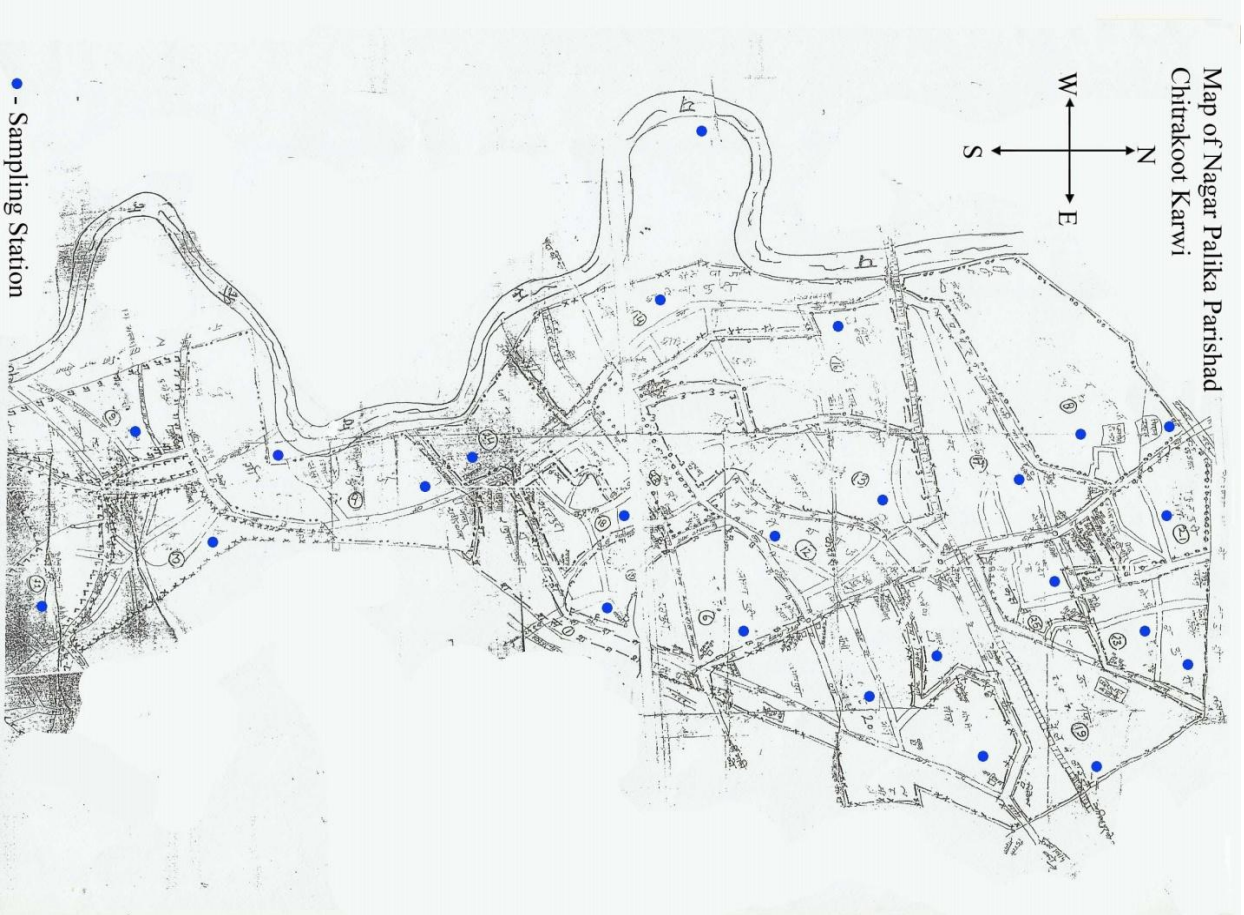
Present Study on the Quantifying the generation of MSW and physical Characterization of solid waste in Nagar Panchayat Chitrakoot Satna includes 15 wards. The total solid waste generated 3073.23 kg day^{-1} in Nagar Panchayat Chitrakoot. It is mainly divided biodegradable, non-biodegradable and recyclable, which are 1945.32, 913.88 and 214.03kg day^{-1} respectively. The average per capita solid waste generation rate 0.109 kg day^{-1} capita^{-1} which is less than the Indian standard value.

Keywords: Municipal Solid Waste, Physical Characteristics, Biodegradable, Non-biodegradable, Recyclable.

INTRODUCTION

Chitrakoot is one of the most ancient holy Pilgrim Places of India. Chitrakoot or "the hill of many wonders" is a hallowed centre of pilgrimage. The holy Town is set on the banks of the river Mandakini, also known as Payaswaini River. It is 80 km away from District head quarter toward North. The locations Map of Nagar Panchayat Chitrakoot is shown in Figure1. Environmental problems have globally received more and more attention in recent years and efforts have been made to decrease environmental problems. The generation of solid waste contributes to environmental problems when treating and disposing solid waste. Many problems are involved in collection and treatment of municipal solid waste [1-4].Depending upon the level of exposure, lead has potential to cause a variety of biological and environmental effects. Soils get contaminated with heavy metals after addition of solid waste [5]. The heavy metal content in west composition as record in the literature [6-9]. There are many categories of MSW, as food waste, rubbish, commercial waste, street sweeping waste, institutional waste, industrial waste and sanitation waste. MSW contains recyclable(paper, plastic, glass, metals, rubber), toxic substances, compostable organic matter and soild waste(bloodstained cotton, sanitary napkins, disposable syringe [10-12].When municipal solid waste is discharged into containers without any separations the result is a mix having a complex physical composition making treatment more difficult. The composition and the quantity of MSW generated from the basis on which the management system needs to be planning. Municipal solid waste management is (MSWM) one of the environmental problems in India. Improper management of municipal solid waste

(MSW) causes hazardous to the inhabitants. In India studies reveal that about 85%-90% of MSW is disposed of unscientifically in an open land and landfills, creating problem to public health and overall environment. Urbanization and Industrialization has increased the quantity and diverse nature of wastes, which need proper handling and treatment. India is a mixed demographic profile with about 300 million of total population living in urban area. In most of the urban areas are highly unsatisfactory due to inadequate services, limited finances and municipal authorities as well as people's apathetic behavior towards MSWM.. The solid waste management is one of the essential duties of municipal bodies to arrange for daily street sweeping, cleaning, collection, transportation processing and disposal of waste in scientific way at appropriate site. Improper handing and disposal practices of solid wastes continue to bee a serious problem [13]. Environment pollution is a major problem associated with rapid industrialization, urbanization and the rise in living standard of people [14]. Plastics are considered, as a marvel of polymer chemistry and become in dispensable in part of our daily life throught the world. But reported reprocessing of the plastics waste and its disposal causes environment problems and pose health hazards in addition to being a public nuisance [15]. A large portion of municipal solid wastes comes from residential area as residential solid wastes. If these wastes are processed within complex area then a considerable load of municipal solid wastes will be reduced. In almost all municipalities in India, the authorities are overburden to solve solid waste problem [16]. In Chitrakoot Nagar Panchayat, MSW contains mostly compostable waste. In India, MSW differs greatly with regard to the composition and hazardous nature, compared to MSW in Western Countries[17-19]·The composition of MSW at generation sources and collection points was determined on a weight basis and it consists mainly of a large organic fraction(40-60%),ash and stone (30-40%), paper (3-6%) and plastic, glass and metals(each less than 1).



MATERIALS AND METHODS

In the first phase of the study, sample of MSW from different wards were collected randomly, one samples from each wards. Physical characterizations of MSW were carried out on segregation site. Further, the per capita generation rate was calculated. All the parameters procedure was followed as per standard methods [20-23].

RESULTS AND DISCUSSION

Total MSW was classified in the nine categories paper, plastic, rags, rubber, leather, glass, metal, total compostable matter and non- biodegradable waste, detail are given in **table 1 and figure-1**. The annual collection of these waste paper (4.0), plastic (2.9), rags (2.5), rubber (0.51), leather (0.13), glass (0.20), metal (0.23), TCM (60.23) and non-biodegradable (29.11) percent of total waste 959.73 tons/year. The maximum weight of paper, plastic, rags, rubber, leather, glass, metals, TCM and non-biodegradable waste was found in ward number 1, 10, 1, 10,10,10,10,10,1 and 10 respectively. The minimum weight of paper (0.81), plastic (0.95), rags (0.51), rubber (0.10), leather (0.01), glass (0.4), metal (0.03), TCM (10.79) and non-biodegradable (9.32) was found in ward number 8, 14, 8, 14, 8, 14, 8,8 and 14 respectively. The maximum percentage of paper (4.6), plastic (3.2), rags (2.8), rubber (0.72), leather (0.19), glass (0.25), metal (0.27), TCM (61.41) and non-biodegradable (29.99) was found in ward number 8, 2, 8, 10, 10, 10, 10, 13 and 15. The minimum percentage of paper of (3.5), plastic (2.7), rags (2.3), rubber (0.26), leather (0.05), glass (0.11), metal (0.14), TCM (59.5) and non-biodegradable(28.32) was found in ward number 6, 6,4 15, 8, 14, 4, 15 and 02 respectively. On the basis of nature of solid waste, it is classified in three categories- biodegradable, non- biodegradable and recyclable waste which found 1945.32, 913.88 and 214.03kg day^{-1} respectively. The population of Chitrakoot Nagar Panchayat is 28091.88 and per capita generation rate of solid waste are 0.109kg day^{-1} $capita^{-1}$ which is given in **table 2 and figure-2.** The maximum solid waste generation was found in ward number 10 (86.37 tons $year^{-1}$) and minimum solid waste generation rate was found in ward number 8 (17.43 tons $year^{-1}$).

Table 1: Annual Solid Waste Generation in different Ward of Nagar Panchayat Chitrakoot (Tons $year^{-1}$)

Sr. No.	Ward Name	Paper	Plastic	Rags	Rubber	Leather	Glass	Metal	Total Compostable Matter	Non-Biodegradable Waste	Total MSW
1	**Kamadgiri**	3.4	2.4	2.2	0.55	0.14	0.2	0.21	51.77	24.72	87.39
		(4)	(2.8)	(2.5)	(0.64)	(0.16)	(0.23)	(0.24)	(60.4)	(28.85)	99.82
2	**Bihari ji**	2.7	2	1.5	0.39	0.09	0.14	0.15	37.78	17.74	66.49
		(4.3)	(3.2)	(2.3)	(0.62)	(0.14)	(0.22)	(0.23)	(60.3)	(28.32)	99.63
3	**Tulsi**	2.6	2	1.6	0.38	0.09	0.15	0.16	39.84	19.97	66.79
		(3.9)	(3.0)	(2.4)	(0.56)	(0.13)	(0.22)	(0.18)	(59.57)	(29.86)	99.82
4	**Parnkuti**	2.8	2.2	1.8	0.41	0.1	0.17	0.18	45.61	22.75	76.02
		(3.6)	(2.8)	(2.3)	(0.53)	(0.13)	(0.22)	(0.23)	(59.83)	(29.84)	99.48
5	**Mandakini**	2.8	2.1	1.8	0.36	0.08	0.15	0.16	42.78	21.21	71.44
		(3.9)	(2.9)	(2.5)	(0.50)	(0.11)	(0.20)	(0.22)	(59.70)	(29.70)	99.73
6	**Raghav**	2.7	2.1	1.8	0.35	0.09	0.15	0.17	45.78	22.7	75.48
		(3.5)	(2.7)	(2.3)	(0.46)	(0.11)	(0.19)	(0.22)	(60.2)	(29.87)	99.55
7	**Hanuman**	2.7	1.8	1.8	0.31	0.08	0.14	0.15	43.39	20.6	70.97
		(3.9)	(2.8)	(2.5)	(0.43)	(0.11)	(0.19)	(0.21)	(60.70)	(28.87)	99.71

8	**Shavri**	0.8	0.5	0.5	0.08	0.01	0.02	0.03	10.79	4.7	17.43
		(4.6)	(3.2)	(2.8)	(0.45)	(0.05)	(0.11)	(0.17)	(61.09)	(26.61)	99.08
9	**Vaidehi**	2.8	2	1.7	0.25	0.07	0.12	0.15	41.72	20.32	69.13
		(4.0)	(2.9)	(2.4)	(0.36)	(0.10)	(0.17)	(0.21)	(60.20)	(29.33)	99.67
10	**Paisuni**	3.3	2.7	2.1	0.63	0.17	0.22	0.25	51.55	25.45	86.37
		(3.8)	(3.1)	(2.4)	(0.72)	(0.19)	(0.25)	(0.27)	(59.50)	(29.40)	99.63
11	**Sphatika Shila**	2.9	2.1	1.7	0.41	0.11	0.16	0.18	41.19	19.98	68.73
		(4.2)	(3.0)	(2.4)	(0.59)	(0.16)	(0.21)	(0.24)	(60.00)	(29.14)	99.94
12	**Sati Ansuiya**	2.7	1.9	1.7	0.32	0.08	0.13	0.15	41.12	19.91	68.01
		(4.0)	(2.9)	(2.4)	(0.46)	(0.11)	(0.19)	?(0.21)	(60.26)	(29.18)	99.74
13	**Mahatma Gandhi**	2.2	1.4	1.4	0.2	0.04	0.08	0.09	31.28	14.05	50.74
		(4.3)	(2.7)	(2.7)	(0.39)	(0.07)	(0.15)	(0.17)	(61.41)	(27.58)	99.41
14	**Pashuptti Nath**	1.5	0.95	0.93	0.1	0.02	0.05	0.05	20.44	9.32	33.36
		(4.4)	(2.8)	(2.7)	(0.30)	(0.05)	(0.11)	(0.14)	(61.12)	(27.89)	99.51
15	**Godavari**	2.2	1.5	1.4	0.14	0.04	0.06	0.08	31.69	15.97	53.08
		(4.1)	(2.8)	(2.6)	(0.26)	(0.07)	(0.11)	(0.15)	(59.5)	(29.99)	99.58
	Total(tons)	**38.8**	**28.49**	**24.52**	**4.9**	**1.27**	**2**	**2.21**	**578.06**	**279.44**	**959.65**
	%	**4.04**	**2.96**	**2.55**	**0.51**	**0.13**	**0.20**	**0.23**	**60.23**	**29.11**	**99.96**

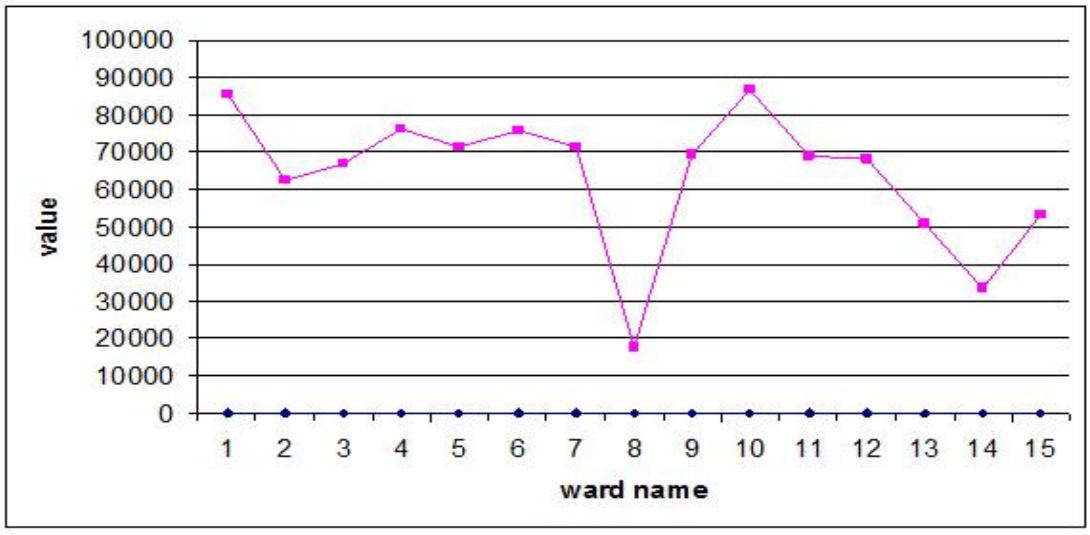


Figure 2: Graphical Representation of Annual Solid Waste Generation in different ward of Nagar Panchayat Chitrakoot Satna

Table 2: Major Classified Municipal Waste Generation (kg day^{-1})

Sr. No.	Waste Category	Per day Generated Waste (kg/day)	Population	Per Capita Generated Waste in kg
1	Bio- degradable waste	1945.32		
2	Non-biodegradable waste	913.88	18981	0.109kg/day/person
3	Recyclable waste	214.03		
	Total	3073.23		

The differences in the MSW Characteristics indicate the effect of urbanization and development. In urban areas, the major fraction of MSW is compostable materials (40-60 %) and non-biodegradable (30-50%). The relative percentage of organic waste in MSW is generally increasing with the decrease socio-economic status- rural house holds generate more organic waste than urban households. For example, in South India the extensive use of banana leaves and stems in various functions, results in a large organic contents in the MSW. Also, it has been noticed that percentage of recyclables (paper, plastic, rubber, glass and metals) is very low, because of rag pickers who segregate and collect the materials at generation sources, collection points and disposal sites. The per capita generation rate is high in some state (Gujarat, Delhi and Tami Nadu) and cities (Madras, Kanpur, Lucknow and Ahmedabad). This may be due to the high living standards, the rapid economic growth and the capita generation rate is observed to be low in other states (Meghalya, Assam, Manipur and Tripura) and Cities(Nagpur, Pune and Indore)[24].

APPLICATIONS

The segregation of waste at source and promotion of recycling of segregated materials reduces the quantity of waste and the burden on landfills, and provides raw materials for manufactures. In the studied area the average per capita solid waste generation rate is 0.109 kg day^{-1} $capita^{-1}$ which is less than the Indian standard value.

CONCLUSIONS

The segregation of waste at source and promotion of recycling or reuse of segregated materials reduces the quantity of waste and the burden on landfills, and provides raw materials for manufactures. The composition of MSW shows mostly organic matter, so composting is a good method for the treatment and production of soil amendment. The MSW generation rates in small towns are lower than those of metro cities, and the per capita generation rate of MSW in India rages from 0.2 to 0.5 kg/day[10.] In Chitrakoot Nagar Panchayat per capita MSW generation rate 0.109 kg/person/day. This is less than the standard: therefore MSW management is a no problem in Chitrakoot Nagar Panchayat.

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